

The opinion in support of the decision being entered today is not binding precedent of the Board.

Paper ~~88~~ 34

By: Trial Section Merits Panel  
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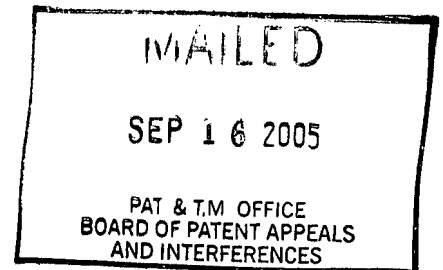
BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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PECHINEY EMBALLAGE FLEXIBLE EUROPE  
Junior Party,  
U.S. Patent 6,437,064

v.

CRYOVAC, INC.  
Senior Party,  
Application 08/996,367  
Application 09/583,654



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Patent Interference No. 105,092

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Before: McKELVEY, Senior Administrative Patent Judge, and SCHAFER and SPIEGEL, Administrative Patent Judges.

SPIEGEL, Administrative Patent Judge.<sup>1</sup>

**DECISION - REHEARING - Bd. R. 125(c)**

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<sup>1</sup> As part of the Board's efforts under the Government Paperwork Elimination Act, signatures on papers originating from the Board are being phased out in favor of a completely electronic record. Consequently, in this case papers originating at the Board will not have signatures. The signature requirements for the parties have not changed. See e.g., 37 C.F.R. § 10.18.

## I. Introduction

This is a decision reconsidering our ORDER - RULE 121(f) ("ORDER," Paper 81) wherein senior party Cryovac's claims were sua sponte held to be unpatentable under 35 U.S.C. § 112, second paragraph, and § 103(a).

## II. Background

As discussed in the ORDER, beginning around 1980, film manufacturers rapidly began shifting to use of low-density copolymers consisting of linear ethylene backbones with short side chains of other alpha-olefin monomers like butene, hexene and octene (i.e., linear low density polyethylene or LLDPE) to make shrink films. By 1991, most linear ethylene polymers were made using some type of Ziegler-Natta multi-site catalyst. Multi-site catalysts produce resins with broad molecular weight and composition distributions because each catalytic site produces a different molecular species of polymer of varied chain length and because levels of comonomer are unevenly distributed between the chains. A single-site catalyst, on the other hand, contains only one active site and, therefore, produces only one type of resin with very narrow molecular weight and composition distributions. Furthermore, single-site catalysts are said to be versatile enough to synthesize all major alpha olefin monomers, including polypropylene, butene, hexane and octene. [Paper 81, pp. 6-7; Ex 3003,<sup>2</sup> p. 21, c. 1, ¶ 3.]

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<sup>2</sup> Martino, R., "PLASTISCOPE: Newpolyolefin resins emerge: 'Branched linear' copolymers," Modern Plastics, pp. 20-22 and 25, November 1992 (Ex 3003, of record).

The subject matter of the interference is directed to a heat shrink film comprising at least two layers wherein a first layer comprises a copolymer of ethylene and a C<sub>3</sub>-C<sub>20</sub> alpha olefin made using a single-site catalyst.

### III. Findings of fact (FF)

The following findings of fact are supported by a preponderance of the evidence.

1. The junior part is John P. Eckstein, Johnny Q. Zheng, Mark E. Nordness, Keith D. Lind, George H. Walburn, Mary E. Shepard, Gregory K. Jones and Gregory J. Seeke (**Pechiney**).
2. Pechiney is involved in the interference on the basis of U.S. Patent 6,437,064 ("Pechiney '064," Ex 3006), issued 20 August 2002, based on application 09/006,700, filed 14 January 1998.
3. Pechiney's real party-in-interest is PECHINEY EMBALLAGE FLEXIBLE EUROPE.
4. The senior party is (a) Kelly R. Ahlgren, Robert Babrowicz, Solomon Bekele, Blaine C. Childress, Marvin R. Havens, Vincent W. Herran, Ronald D. Moffit, Gautam P. Shah and George D. Wofford; and, (b) Kelly R. Ahlgren, Robert Babrowicz, Solomon Bekele, Blaine C. Childress, Marvin R. Havens, Ronald D. Moffit, Gautam P. Shah and George Wofford (collectively, **Cryovac**).
5. Cryovac is involved in the interference on the basis of (a) application 08/966,367 ("Cryovac '367," Ex 3007), filed 22 December 1997 and (b) application 09/583,654 ("Cryovac '654," Ex 3008), filed 30 May 2000.
6. Cryovac's real party-in-interest is CRYOVAC, INC.

7. The subject matter of the interference is defined by a single count, Count 1, i.e.,  
"A heat shrink film according to claim 7 of U.S. Patent 6,347,064" (Paper 1, p. 6).
8. Pechiney claim 7 recites a heat shrink film comprising at least two layers  
wherein a first layer comprises a copolymer of ethylene and a C<sub>3</sub>-C<sub>20</sub> alpha olefin  
formed by a polymerization reaction using a single-site catalyst.
9. The claims of the parties are:

|              |                                    |
|--------------|------------------------------------|
| Pechiney     | 1-39                               |
| Cryovac '367 | 1-8, 10-24, 26-43, 46-56 and 61-64 |
| Cryovac '654 | 1, 3-5 and 7-26                    |
10. The claims of the parties which correspond to Count 1 are:

|              |                                    |
|--------------|------------------------------------|
| Pechiney     | 1-3, 6-19 and 22-39                |
| Cryovac '367 | 1-8, 10-24, 26-43, 46-56 and 61-63 |
| Cryovac '654 | 1, 3-5, 7, 10-14 and 20-26         |
11. The claims of the parties which do not correspond to Count 1, and therefore are  
not involved in the interference, are:

|              |                 |
|--------------|-----------------|
| Pechiney     | 4, 5, 20 and 21 |
| Cryovac '367 | 64              |
| Cryovac '654 | 8, 9 and 15-19  |
12. Pechiney filed a request for entry of adverse judgment (see "PECHINEY  
REQUEST FOR ADVERSE JUDGMENT," Paper 76, filed 12 August 2004).
13. The Board ordered the parties to present their views, including any argument  
and supporting evidence, as to why Cryovac's involved claims are not  
unpatentable under 35 U.S.C. § 112, second paragraph, and § 103(a) for  
reasons given in the ORDER (Paper 81, p. 38).

14. The relevant prior art is

|                                       |              |               |
|---------------------------------------|--------------|---------------|
| Newsome (Ex 3013)                     | US 4,457,960 | 03 July 1984  |
| Mueller (Ex 3011)                     | US 4,532,189 | 30 July 1985  |
| Ferguson et al. ("Ferguson," Ex 3012) | US 4,640,856 | 03 Feb. 1987  |
| Warren ("Warren I," Ex 3022)          | US 4,837,084 | 06 Jun. 1989  |
| Warren ("Warren II," Ex 3023)         | US 4,957,790 | 18 Sept. 1990 |
| Lai et al. ("Lai," Ex 3010)           | US 5,272,236 | 21 Dec. 1993  |
| Dow Chemical Co. ("Dow," Ex 3009)     | EP A 416 815 | 13 Mar. 1991  |

Dow CGCT XUR-1567-48562-xx resins supplied to Cryovac for evaluation (see Exs 3016-3019)

15. In particular, the Board requested the parties to comment on why

- (a) Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 are not unpatentable under § 112, second paragraph, in reciting "long chain branching" (Paper 81, pp. 13-16);
- (b) Cryovac '654 claims 1, 3-5, 7, 10, 12-14 and 20-26 are not unpatentable under § 103(a) over Mueller, Lai and Dow (Paper 81, pp. 16-19);
- (c) Cryovac '654 claim 11 is not unpatentable under § 103(a) over Mueller, Lai, Dow and either Ferguson or Newsome (Paper 81, pp. 19-20);
- (d) Cryovac '654 claims 1, 3-5, 7, 10, 12-14 and 20-26 are not unpatentable under § 103(a) over Mueller and Dow CGCT XUR-1567-48562-xx resins (Paper 81, pp. 20-24);<sup>3</sup>
- (e) Cryovac '654 claim 11 is not unpatentable under § 103(a) over Mueller,

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<sup>3</sup> The resin number was sometimes incorrectly transposed as CGCT XUR-1557-48652-xx in Paper No. 81. The correct resin number is CGCT XUR-1567-48562-xx.

Dow CGCT XUR-1567-48562-xx resins and either Ferguson or Newsome (Paper 81, pp. 24-25);

- (f) Cryovac '367 claims 1-2, 7-8, 10-11, 16-17, 35-36, 42-43, 46-54, 56 and 61-63 are not unpatentable under § 103(a) over Mueller, Lai and Dow (Paper 81, pp. 29-31);
- (g) Cryovac '367 claims 3-6, 23-24, 37, 39 and 41 are not unpatentable under § 103(a) over Mueller, Lai, Dow and Warren I (Paper 81, pp. 31-32);
- (h) Cryovac '367 claims 12-15, 18-34, 38, 40 and 55 are not unpatentable under § 103(a) over Mueller, Lai, Dow, Warren I, Ferguson, Newsome and Warren II (Paper 81, pp. 32-35);
- (i) Cryovac '367 claims 1-2, 7-8, 11, 16-17, 35-36, 42-43, 46-54, 56 and 61-63 are not unpatentable under § 103(a) over Mueller and Dow CGCT XUR-1567-48562-xx resins (Paper 81, pp.35-36);
- (j) Cryovac '367 claims 3-6, 23-24, 37, 39 and 41 are not unpatentable under § 103(a) over Mueller, Dow CGCT XUR-1567-48562-xx resins and Warren I (Paper 81, p. 36); and,
- (k) Cryovac '367 claims 12-15, 18-34, 38, 40 and 55 are not unpatentable over Mueller, Dow CGCT XUR-1567-48562-xx resins, Warren I, Ferguson, Newsome and Warren II (Paper 81, pp. 36-37).

16. Action on Pechiney's request for adverse judgment was deferred pending resolution of patentability issues raised in the ORDER concerning Cryovac's involved claims (Paper 81, pp. 1-2).

17. In response to the ORDER, Pechiney stated that "it has not formed any view with respect to patentability of Cryovac's claims" (Paper 85, p. 2).
18. In response to the ORDER, Cryovac submitted both arguments and evidence supporting its view that certain of the involved Cryovac claims are not unpatentable (Papers 86 and 87).
19. Cryovac presented "no comments regarding the patentability over the prior art of Cryovac '654 claims 1, 3-5, 10, 12-14, 23, and 24" (Paper 86, p. 1, last sentence).
20. According to Cryovac, "the Dow technology and resins recited in the involved Cryovac '654 claims are the same as the CGCT [constrained geometry catalyst technology] and resins described by Lai" (Paper 86, p. 6, ll. 5-8).

#### **IV. Discussion**

##### **A. Reconsideration of the unpatentability of Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 under § 112, ¶ 2**

21. The ORDER noted that all of the involved Cryovac '654 claims require a single-site catalyzed copolymer having "long chain branching" (Paper 81, p. 13).
22. Lai, assigned to The Dow Chemical Company, defines "long chain branching" as "a chain length of at least about 6 carbons, ... [and] can be as long as about the same length of the polymer backbone" (Ex 3010, c. 3, ll. 58-63) (see Paper 81, p. 15, ll. 2-4).
23. Based on Lai's definition of "long chain branching," the Board construed a polymer "having long chain branching" as encompassing a polymer having any

degree amount of long chain branching, wherein a long chain branch has a chain length of at least about 6 carbons (Paper 81, p. 15, ll. 5-11).

24. As set forth in the ORDER,

... Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 are unclear in reciting films comprising single-site catalyzed ethylene/C<sub>3-7</sub> alpha olefin copolymers because these copolymers apparently would not have any long chain branching, i.e., side chains at least about 6 carbons in length. Alternatively, to the extent Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 intend to recite use of single-site catalyzed ethylene/C<sub>3-10</sub> alpha olefin copolymers having some undefined, nonuniform side chain branching in addition to the uniform one to eight carbon long side chains expected from the use of a C<sub>3-10</sub> alpha olefin, the claims do not particularly point out and distinctly claim this subject matter. [Paper 81, p. 15, l. 16 - p. 16, l. 1.]

25. In essence, Cryovac's response is that one of ordinary skill in the art would have understood "long chain branching" as describing a particular type of polymer architecture (Paper 86, p. 1, ¶ 2) and that the definition in Lai is partially incorrect (Paper 86, p. 11, ¶ 2).

26. Examples of art recognized definitions of "long chain branching" proffered by Cryovac include the following:

- (a) Branched polyethylene ... contains long-chain branches (LCB). Linear polyethylenes ... contains no long-chain branching. Both branched and linear polyethylene may contain short-chain branching (SCB). [ENCYCLOPEDIA OF POLYMER SCIENCE AND ENGINEERING, Second edition, vol. 6, p. 430, (John Wiley & Sons, 1986), Ex 1013.]
- (b) In general, LCBs have been accepted to be comparable in length to the main chain of the polyethylene molecule. It is evident, however, that the LCB length (and thus LCB concentration) will differ somewhat according to the method by which it is being measured. For instance, the minimum length of a straight chain alkane branch detected as a long chain branch by SEC [size exclusion chromatography] measurements is greater than six and less than 12 carbons, while branches six carbons and longer are



considered to be long when measured by  $^{13}\text{C}$ -NMR spectroscopy. The minimum length required for branches to be considered "long" by rheological measurements has not been established. It may in fact depend on the particular rheological property that is being considered. [Bugada et al., "Sizes of Long Branches in Low Density Polyethylenes," Journal of Applied Polymer Science, Vol. 33, pp. 87-93 (1987) at p. 87, penultimate ¶, Ex 1015.]

- (c) As mentioned,  $^{13}\text{C}$ -NMR analyses count all branches longer than C5 as "long," while the minimum branch length to be measured as "long" in SEC determinations lies between C6 and C12. The mean long branch lengths that actually exist in LDPEs [low density polyethylenes] appear to be in the order of 200-300 carbons in length. These analytical techniques certainly do not underestimate the frequency of long branching in polyethylenes. It remains to be determined whether they measure long branches that are too short to have much effect on properties like melt rheology. [Id., p. 93, ¶ 1.]
- (d) **Long-Chain Branching** In a polymer's structure, the presence of arms (branches) off the main chain that are about as long as the main chain. In making low-density polyethylene, a typical molecule may contain 50 short branches and only one or zero long branch, yet the presence of long branches greatly broadens the molecular weight distribution. Polymers containing long branches tend to be less crystalline than the corresponding polymers without long branches. [WHITTINGTON'S DICTIONARY OF PLASTIC, Third edition, p. 285 (Technomic Publishing Company 1983), Ex 1016.]

27. Cryovac maintains that the presence of long chain branching dramatically affects the rheological properties of polyethylene ("PE") and that the long chain branches responsible for rheological properties are at least hundreds of carbons long (Paper 86, p. 9, ¶¶ 4-5).

28. For example, an article by Bersted<sup>4</sup> stated that "Long chain branching has been demonstrated to have significant effects on the rheological behavior, morphology, physical properties, and environmental stress cracking of polyethylene" (Ex 1018, p. 3751, ¶ 2).
29. The Bersted article is said to demonstrate that variations in both the viscosity at low shear rates and the activation energy at low branching levels are consistent with the idea that not every molecule can contain a long chain branch, and that *the resultant rheological behavior is based on the relative proportions of branched and linear species*. Moreover, the relative proportions of branched and linear species, and consequently *the rheological behavior, at a given branching level* will depend on the branching mechanism; [Ex 1018, p. 3762, last ¶, emphasis added.]
30. Thus, the Bersted article cautions that "model compounds such as star molecules are not correct models for commercial randomly branched materials" (Ex 1018, p. 3763, ll. 16-17).
31. An article by Graessley<sup>5</sup> also stated that "[w]hen the [polymer] molecules are branched, the behavior varies with the number, location, and length of the branches" (Ex 1019, p. 332, c. 1, ¶ 3).
32. The Graessley article also discussed the effect of branching on star molecules, purportedly because "they represent the simplest case of branching, a single branch point and only two structural parameters: the number of arms, *f*, and the

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<sup>4</sup> B. Bersted, "On the Effects of Very Low Levels of Long Chain Branching on Rheological Behavior in Polyethylene," Journal of Applied Polymer Science, Vol. 30, pp. 3751-3765 (1985) (Ex 1018).

<sup>5</sup> W. Graessley, "Effect of Long Branches on the Flow Properties of Polymers," Accounts of Chemical Research, Vol. 10, pp. 332-339 (1977) (Ex 1019).

branch molecular weight,  $M_b = M / P'$  (Ex 1019, p. 333, sentence bridging cc. 1-2).

33. Similarly, an article by Hughes<sup>6</sup> concluded that

[s]mall amounts of LCB were found to have very large effects upon the rheological properties of HDPE melts at low frequencies but not at high frequencies. This indicates that low concentration of LCB may have significant effects upon the processing characteristics of HDPE. [Ex 1020, p. 307, c. 2, ¶ 2.]

34. In its response (Paper 86, pp. 10 and 18), Cryovac also alleges that the following passage in its '654 specification describes what is meant by

homogeneous single-site catalyzed copolymers having long chain branching:<sup>7</sup>

a typical metallocene catalyzed ethylene alpha-olefin may be thought of as a collection of linear chains, each of substantially identical length, each having approximately the same number of short chain (comonomer) branches distributed at regular intervals along that length. Splicing an abbreviated linear chain with the same regular comonomer distribution onto each of the linear chains, or at least some of the chains in the collection, yields an ethylene alpha-olefin with essentially all of the physical properties of the original copolymer, but with an improved "body" or melt strength for improved processability including improved extrudability, orientation speeds and susceptibility to irradiation. [Ex 3008, ¶ bridging pp. 5-6.]

Thus, Cryovac's position is, in essence, that the term "long chain branching" is a term of art referring to pendant chains attached to a polymer backbone that are about as long as the polymer backbone, typically at least hundreds of carbon atoms in length, and that the presence of even minor amounts of long chain branching, e.g., in the

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<sup>6</sup> J. Hughes, "Analysis of Long Chain Branching in High Density Polyethylene," *ANTEC '83*, pp. 306-309 (1983) (Ex 1020).

<sup>7</sup> Cryovac inadvertently states the citation is at Ex 3009 at p. 7, ll. 17-31.

range of 200-300 carbon atoms in length, affects the rheological properties of the resin (see Paper 86, ¶ bridging pp. 18-19; FF 26-33). Cryovac alleges that this definition of "long term branching" is somehow inherently set forth in the '654 specification (FF 34).

According to Cryovac, the resins described in the '654 claims are the same as the resins described by Lai, which defines "long chain branching" as "a chain length of at least about 6 carbons, ... [and] can be as long as about the same length of the polymer backbone" (Ex 3010, c. 3, ll. 58-63) (FF 19).

35. However, Cryovac argues that the Lai definition of long chain branching is correct only to the extent that it states long chain branches are about the same length as the length of the polymer backbone (Paper 86, p. 20, last ¶).
36. Cryovac further argues that the Lai definition of long chain branching is in error to the extent that it states long chain branches begin with a chain length of 6 carbon atoms (Paper 86, ¶ bridging pp. 20-21).
37. Specifically, Cryovac argues that the "desired rheological properties require a branch length much greater than 6 carbon atoms" (Paper 86, p. 21, ¶ 1).

This is mere attorney argument which does not point us to any claimed rheological properties or to any concrete evidence of what manner of branching (e.g., star, comb, tree), what level of branching, or what relative proportions of linear and branched species is present or what one of ordinary skill in the art would have understood to be present from a given rheological property(ies).

38. Cryovac further argues that defining a long chain branch as a chain length of 6 carbon atoms is inconsistent with well known linear PEs of the prior art (Paper

86, p. 21, ¶ 2).

39. Specifically, Cryovac points out that Dow Chemical Company, Lai's assignee, commercially markets "low-density copolymers consisting of linear ethylene backbones (hence, 'LLDPE') with short side chains of other alpha-olefin monomers like butene, hexene, and octene" (see Ex 3003, p. 21, c. 1, ¶ 3).

In other words, Cryovac is essentially argues that since an ethylene - octene linear copolymer would be expected to have a side chain 6 carbon atoms long and since linear PEs by definition do not contain long chain branching, it is nonsensical for Lai to define long chain branching as a chain length of about 6 carbon atoms when its own assignee markets PEs having side chains 6 carbon atoms long as "linear" low density PEs.

40. By way of possible explanation, Cryovac notes that  $^{13}\text{C}$ -NMR measurements, such as used by Lai to determine the presence of long chain branching, count all branches longer than about 6 carbon atoms as "long," whereas actual lengths of long chains are actually much longer, e.g., on the order of 200-300 carbon atoms in length (Paper 86, p. 21, ¶ 3; FF 25(c)).
41. U.S. Patent 6,306,969, issued to Patel et al. ("Patel," Ex 1021), like Lai, is also assigned to Dow Chemical Company.
42. Patel expressly references Lai as disclosing substantially linear ethylene polymers (Ex 1021, c. 12, ll. 38-40).
43. According to Patel,

[t]he term "substantially linear ethylene polymer" is used herein to

refer specially to homogeneously branched ethylene polymers that have long chain branching. The term does not refer to heterogeneously or homogeneously branched ethylene polymers that have a linear polymer backbone.

For substantially linear ethylene polymers, the long chain branches have the same comonomer distribution as the polymer backbone, and the long chain branches can be as long as about the same length of the polymer backbone to which they are attached. The substantially linear ethylene polymers used in the present invention have from 0.01 long chain branches/1000 carbons to 3 long chain branches/1000 carbons, more preferably from 0.01 long chain branches/1000 carbons to about 1 long chain branches/1000 carbons, and especially from 0.05 long chain branches/1000 carbons to 1 long chain branches/1000 carbons.

Long chain branching is defined herein as a chain length of at least 6 carbons, *above which the length cannot be distinguished using <sup>13</sup>C nuclear magnetic resonance [NMR] spectroscopy. Long chain branches are obviously of greater length than of short chain branches resulting from comonomer incorporation.* [Ex 1021, c. 11, ll. 19-40, emphasis added.]

44. Thus, Cryovac asserts that Dow Chemical Company recognized its "error" in Lai and "corrected this error by stating 'long chain branches are obviously of greater length than of short chain branches resulting from comonomer incorporation'" in Patel (Paper 86, p. 21, ¶ 3).

Upon reconsideration and based on the foregoing, including Cryovac's statement that the copolymers recited in its involved '654 claims are the same copolymers described by Lai (FF 20) and in view of the significant effect long chain branching is known to have on rheological behavior (FF 26-32), we conclude that

(a) "long chain branching" is a term of art referring to pendant chains attached to a polymer backbone that are about as long as the polymer backbone, typically at least two to three hundred carbon atoms in length, and

(b) the polymer backbone of the copolymers recited in the involved '654 claims are either unsubstituted or substituted with up to 3 long chain branches/1000 carbons as described by Lai (Ex 3010, c. 3, ll. 48-50).

Therefore, the proposed holding of unpatentability of Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 as unpatentable under 35 U.S.C. § 112, second paragraph; set forth in the ORDER (Paper 81, pp. 13-16) is withdrawn.

**B. Reconsideration of the unpatentability of Cryovac '654 claims 7, 20-22, 25 and 26 under § 103(a) over Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 3009)**

45. The ORDER set forth the proposed holding of unpatentability of Cryovac '654 claims 1, 3-5, 7, 10, 12-14 and 20-26 based on the teachings of Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 3009) (Paper 81, pp. 16-19).
46. The proposed ground of unpatentability was that

[i]t would have been obvious to one of ordinary skill in the art to modify the multilayer heat shrink film of Mueller by substituting Lai's elastic substantially linear olefin polymers, e.g., a preferred ethylene/1-octene copolymer, for the conventional LLDPEs used by Mueller. Use of Lai's elastic substantially linear olefin polymers would provide the processability of a conventional LDPE but with the strength and toughness of a conventional LLDPE. Moreover, insofar as both Cryovac '654 and Lai describe substantially similar resins, i.e., homogeneous ethylene/1-octene copolymers having long chain branching, overlapping densities and melt indices, and said to be produced using the same CGCT technology described by Dow, one of ordinary skill in the art would have had a reasonable basis to expect a Mueller/Lai/Dow film to have similar L+T free shrink percents and orientation temperatures, especially since Dow describes typical melting points for these resins as ranging from 50°C to 135°C. [Paper 81, p. 19, ¶ 3.]

**1. Cryovac does not contest the unpatentability of Cryovac '654 claims 1, 3-5, 10, 12-14, 23 and 24 over the prior art**

As stated above (FF 19), Cryovac has not presented any comment regarding patentability of Cryovac '654 claims 1, 3-5, 10, 12-14, 23 and 24 over the prior art (Paper 86, p. 22, ¶ 2).

**2. Cryovac '654 claim 7**

47. Cryovac '654 claim 1 reads:

A film suitable for packing comprising a homogeneous single site catalyzed copolymer of ethylene and a C<sub>3-10</sub> alpha olefin, wherein the single-site catalyzed copolymer has long chain branching wherein said film is a multilayer film and is heat shrinkable.

48. Cryovac '654 claim 7 requires the single-site catalyzed copolymer recited in claim 1 to have a density of from about 0.895 to 0.915 g/cc.

49. Mueller discloses a multilayer heat shrink film comprising LLDPE resins, i.e., copolymers of ethylene and 8% or less of butene, octene or hexene having a density of 0.910 to 0.925 g/cm<sup>3</sup> with few or no branches or cross-linked structures (Ex 3011, c. 1, ll. 8-13 and c. 3, ll. 57-62).

50. Lai discloses that its single-site catalyzed copolymers densities ranging from 0.85 to 0.97 g/cc (Ex 3010, c. 3, ll. 6-7).

51. Similarly, Dow discloses that its single-site catalyzed copolymers having densities ranging from 0.85 to 0.97 g/cc (Ex 3009, p. 12, l. 39).

52. Cryovac's position is that while Mueller discloses LLDPEs having densities from 0.910 to 0.925 g/cc and Dow and Lai disclose single-site catalyzed copolymers having densities from about 0.85 to 0.97 g/cc, all of the examples in Mueller and



most of the examples in Dow and Lai have densities outside the about 0.895 to 0.915 g/cc range required by claim 7. Therefore, Cryovac contends that "no objective evidence is present that would have led to the selection of a polymer falling within the scope of the claimed density range rather than the selection of a copolymer falling outside the claimed range" (Paper 86, p. 24, ¶ 2). [*Id.*, pp. 23-24.]

It is well established that a reference is relevant for all that it teaches and that its disclosure is not limited to preferred embodiments or specific examples contained therein. Ultradent Prods., Inc. v. Life-Like Cosmetics, Inc., 127 F.3d 1065, 1068, 44 USPQ2d 1336, 1339 (Fed. Cir. 1997) (error to construe prior art disclosure as limited to the preferred embodiment); In re Boe, 355 F.2d 961, 965, 148 CCPA 507, 510 (CCPA 1966) (all of the disclosures in a reference, including non-preferred embodiments, "must be evaluated for what they fairly teach one of ordinary skill in the art"); Merck & Co. v. Biocraft Labs., Inc., 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir. 1989) ("the fact that a specific [embodiment] is taught to be preferred is not controlling, since all disclosures of the prior art, including unpreferred embodiments, must be considered") (quoting In re Lamberti, 545 F.2d 747, 750, 192 UPSQ 278, 280 (CCPA 1976)). Here, even Cryovac agrees that some, albeit the minority, of the examples of single-site catalyzed copolymers described in Lai and Dow have densities falling within the scope of claim 7, i.e., from about 0.895 to 0.915 g/cc. Thus, even if we could agree with Cryovac that Mueller, Dow and Lai preferentially direct one of ordinary skill in the art to use copolymers having densities above about 0.915 g/cc, we

cannot agree that Mueller, Dow and Lai would not have also suggested use of copolymers having densities within the claimed range of about 0.895 to 0.915 g/cc.

In short, Cryovac has not submitted evidence sufficient to rebut the prima facie case of obviousness of '654 claim 7 over the teachings of Mueller, Dow and Lai as set forth in the ORDER. Therefore, while we have reconsidered our initial decision, we decline to make any changes therein.

### **3. Cryovac '654 claims 20-22**

53. Cryovac '654 claim 20 requires the film of claim 1 to orient "at a softening temperature of the single site catalyzed copolymer having long chain branching."
54. The orientation temperature of claim 20 is further defined to be from 70°C to 100°C or from 80°C to 100°C by Cryovac '654 claims 21 and 22, respectively.
55. According to Mueller,  
  
[t]he orientation temperature range for a given film will vary with the different resinous polymers and blends thereof which comprise the film. However, the orientation temperature range may generally be stated to be above room temperature and below the melting point of the film. [Ex 3011, c. 1, ll. 28-33.]
56. Cryovac argues that "this general passage does not provide objective evidence that would have suggested the subject matter recited in Cryovac '654 claim 20" (Paper 86, sentence bridging pp. 24-25).

To the contrary, the subject matter of claim 20 is precisely what the above citation from Mueller suggests, i.e., to use an orientation temperature above room temperature and below the melting point of the film, recognizing that the orientation temperature range for a given film varies with the polymers and blends thereof which

comprise the film. If an inner or core layer of a multilayer film melts away, the film melts away. One of ordinary skill in the art would choose an orientation temperature high enough to allow the film to be workable so that it can be stretched, but not high enough to "melt" the structural integrity of or possibly the film itself away. The orientation temperature range of a film is a result effective variable which varies with the polymers and blends thereof from which the film is made. See In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (the optimization of a result effective variable is well within the ambit of one of ordinary skill in the art). In other words, if the orientation temperature is high enough to melt an inner or core layer of a multilayer film, one of ordinary skill in the art would reasonably have expected the film to begin to lose its structural integrity and possibly melt all over the inside of whatever heating zone or oven the film was being processed in depending upon how long the film is exposed to the "melt" temperature. Thus, when the multilayer film exits the oven and is stretched, its layers might well pull apart or a melted inner or core layer might have burned through outer layers leaving it "holey" undesirable for its intended use. Therefore, it would have been obvious to one of ordinary skill in the art to use an orientation temperature above room temperature but below the melting point of film, i.e., a temperature at which the polymer or blend thereof from which the film is made is softened but not melted. In short, the "general" passage in Mueller suggests orienting a multilayered film at a softening temperature of the single site catalyzed copolymer used to make an inner or core layer to maximize workability without disrupting the structural integrity of the film itself, i.e., at a temperature above room temperature and

below the melting point of the film, e.g., at a softening point of the film.

57. Cryovac further argues that the examples in Mueller describe using orientation temperatures well above the claimed "softening temperature" recited in Cryovac '654 claims 20-22 (Paper 86, p. 25, ¶ 3).
58. Cryovac specifically contends that Examples I-III of Mueller use orientation temperatures of 300° F (~149° C), 343° F (~172° C) and 305° F (~152° C), respectively, because of the presence of the propylene copolymer outer layers in the multilayered films of Mueller (Paper 86, p. 25, ¶ 3).
59. Examples I-III of Mueller describe multilayered films comprising an inner or core layer of LLDPE and outer "skin" layers of ethylene propylene copolymer (Ex 3011, c. 8, ll. 41-58; c. 9, ll. 24-40; and, c. 10, ll. 5-18, respectively).
60. Examples I-III of Mueller describe orienting the multilayered film by passing it through a heating zone or oven heated by horizontal, vertical and steam heating elements at about 38 feet per minute (Ex 3011, c. 9, ll. 4-7; c. 9, ll. 54-56; and, c. 10, ll. 36-39, respectively).
61. Example I describes maintaining the horizontal heating element at 200° F (~93° C) and the vertical heating at 300° F (~149° C). The steam element, which supplied heat by being passed through pipes or cans located within the oven, was supplied with steam at 2 psi. [Ex 3011, c. 9, ll. 7-12.]
62. In Example II, the horizontal and vertical heating elements are said to have been maintained at 212° F (~100° C) and 343° F (~172° C), respectively. The steam element is said to have been supplied with steam at 7 psi. [Ex 3011, c. 9, ll. 57-

62.]

63. In Example III, the horizontal and vertical heating elements are said to have been maintained at 200° F (~93° C) and 305° F (~152° C), respectively. The steam element is to have been supplied with steam at 3.5 psi. [Ex 3011, c. 10, ll. 39-44.]

64. In essence, Cryovac contends that the orientation temperature in Mueller Examples I-III is defined solely by the temperature of the vertical heating element within the oven.

What Cryovac has not addressed is what the temperature of the film is when it exits the oven and is then transversely and longitudinally stretched, i.e., oriented. Cryovac has not submitted any concrete evidence to support its contention that orientation temperature is defined solely by the temperature of the hottest heating element within an oven. For example, Cryovac has not proffered a declaration by one of ordinary skill in the art explaining how a desired orientation temperature is attained, e.g., how a heating oven is adjusted to provide a desired orientation temperature and/or how controlling the speed at which a film is passed through a heating oven (i.e., the length of time a film is exposed to the heat within the oven) affects the temperature of the film as it exits the oven. Cryovac has not shown that the temperature a film would have upon exiting the oven (i.e., its orientation temperature) is independent of other process parameters, such as the surface area of the film, the volume of the oven, the temperature of the film when it enters the oven, the capacity at which the film absorbs heat, etc. Cryovac's contention is mere attorney argument which cannot take

the place of concrete evidence and is entitled to no weight vis-a-vis the Mueller teaching as to softening temperatures (FF 55).

65. Cryovac still further argues that '654 claims 21 and 22 are patentable over the art because the examples in Mueller use orientation temperatures of 300° F (~149° C), 343° F (~172° C) and 305° F (~152° C), all higher than the temperatures recited in these claims.

As noted by Mueller (FF 55), the orientation temperature range for a given film varies with the different resinous polymers and blends thereof which comprise the film. Dow states that copolymers produced using CGCT processes typically melt between 50° C to 135° C (FF 46; Ex 3009, p. 12, ll. 40-41). The softening point of a particular resin is below the melting point of a particular resin (see e.g., Ex 1026<sup>8</sup>). Therefore, based on the combined "general" teaching of Mueller and the CGCT resin polymer "specific" teaching of, one of ordinary skill in the art would have been generally chosen a orientation temperature range above room temperature but below 135° C (the highest typical melting point of a CGCT resin polymer). The specific orientation temperature ranges of from 70°C to 100°C or from 80°C to 100°C recited in Cryovac '654 claims 21 and 22, respectively, would have been routine optimization of a result effective variable well within ordinary skill in the art. In other words, selection of softening point temperatures of resin polymers which comprise multilayer films as orientation temperatures would have been obvious for reasons discussed above in regard to

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<sup>8</sup> POLYMER HANDBOOK, fourth ed., Brandrup et al., eds., (John Wiley & Sons, Inc. 1999), pp. 164-165, Ex 1026.

Cryovac '654 claim 20.

Therefore, we have reconsidered our initial decision but decline to make any changes therein.

**4. Cryovac '654 claims 25 and 26**

66. Cryovac '654 claim 25 reads:

A process for making a heat-shrinkable film, comprising:  
(A) extruding a film comprising a homogeneous single site catalyzed copolymer of ethylene and an alpha-olefin having from three to then [sic, ten] carbon atoms, the single site catalyzed copolymer having long chain branching; and  
B) cooling the film to the solid state with water;  
C) reheating the film to a softening temperature of the homogeneous single site catalyzed copolymer having long chain branching;  
D) stretching the film so that an oriented molecular configuration is produced; and  
E) quenching the film while substantially retaining its stretched dimensions to set the film in the oriented molecular configuration.

67. Cryovac '654 claim 26 specifies that the stretching step of claim 25 is carried out using a tenter frame.

68. Cryovac again argues that none of Mueller, Dow or Lai disclose or suggest orienting the claimed film at a softening temperature of the single site catalyzed copolymer as required by claims 25 and 26, especially in view of Mueller's alleged teaching of heating its film to a temperature higher than the softening temperature of the single site catalyzed copolymer as discussed above with respect to Cryovac '654 claim 20 (Paper 86, p. 26, ¶¶ 2-4).

These arguments are unpersuasive for the reasons given above with respect to Cryovac '654 claim 20.

Therefore, we have reconsidered our initial decision but decline to make any changes therein.

**C. Reconsideration of the unpatentability of Cryovac '654 claim 11 under § 103(a) over Mueller (Ex 3011), Lai (Ex 3010), Dow (Ex 3009) and either Ferguson (Ex 3012) or Newsome (Ex 3013)**

69. The ORDER set forth the proposed unpatentability of Cryovac '654 claim 11 based on the teachings of Mueller (Ex 3011), Lai (Ex 3010), Dow (Ex 3009) and either Ferguson (Ex 3012) or Newsome (Ex 3013) (Paper 81, pp. 19-20).
70. Cryovac '654 claim 11 requires the multilayer film of claim 1 to comprise a barrier layer containing at least one member of the group consisting of (a) a vinylidene chloride and vinyl chloride copolymer, (b) a vinylidene chloride and methyl acrylate, (c) ethylene and ethyl acrylate copolymer, (d) vinylidene chloride and acrylonitrile copolymer, and (e) ethylene and vinyl alcohol copolymer.
71. The proposed unpatentability holding was that
- [i]t would have been further obvious to one of ordinary skill in the art to modify the multilayer film of Mueller/Lai/Dow by providing a conventional barrier layer of vinylidene chloride copolymer or ethylene/vinyl alcohol copolymer as described by Ferguson or Newsome. Use of a conventional barrier layer would lower gas and moisture permeability (see Ex 3011, c. 4, ll. 37-40), thereby preventing the surrounding atmosphere from detrimentally affecting the packaged food, e.g., by oxidizing or spoiling the food, by changing its color, by reducing its visual appeal. [Paper 81, p. 20, ¶ 5.]

There is no disagreement that Mueller is silent with respect to the presence of a barrier layer in its disclosed multilayer films or that Ferguson and Newsome both disclose use of a barrier layer in multilayer films (compare Paper 81, FF 42(b), 51 and



53 with Paper 86, p. 14, ¶¶ 1-3).

72. Cryovac contends that Ferguson and Newsome restrict the use of barrier layers to film structures comprising VLDPE and LLDPE, respectively, and since the proposed Mueller/Lai/Dow film structure is different from the film structures of both Ferguson and Newsome, there is no motivation to combine the references as set forth in the ORDER (Paper 86, p. 28, ¶ 3).

73. Cryovac directs attention to Ferguson (Ex 3012) at col. 8, lines 48-60, i.e.,

Another unexpected and beneficial result is the fact that there was a reduction in the oxygen transmission rate so that the film of Examples 1 and 2 demonstrate improved barrier properties. Normally, one would not expect the substitution of a lower density material (VLDPE) for a higher density one (EVA) to result in a better barrier, particularly, since the polyethylenes, in general, have poor oxygen barrier properties as compared to saran,<sup>9</sup> EVOH, nylon, etc.

The same result occurred with water vapor transmission in that it was lowered by the substitution of lower density VLDPE layers for the higher density EVA layers.

74. According to Cryovac, this passage allegedly shows that the unexpected barrier properties of Ferguson's barrier layer "could not be predicted in a structurally different film structure lacking VLDPE, such as the Mueller/Lai/Dow film structure proposed by the Order" (Paper 86, p. 28, ¶ 1).

75. Ferguson describes a control and two exemplary multilayer films, i.e.,

- (i) control: EVA/EVA/PVDC/EVA (Ex 3012, c. 7, ll. 43-44),
- (ii) example I: VLDPE/EVA/PVDC/EVA (Ex 3012, c. 7, ll. 58)
- (iii) example II: VLDPE/EVA/PVDC/VLDPE (Ex 3012, c. 8, ll. 3).

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<sup>9</sup> Saran is vinylidene chloride copolymer (Ex 3012, c. 1, ll. 43-44).

Ferguson's disclosure that substituting VLDPE for EVA resulted in a film having unexpectedly improved barrier properties is not inconsistent with Ferguson's disclosure of conventional barrier layers comprising vinylidene chloride copolymer. According to Ferguson, one would not have expected the substitution of VLDPE for EVA to result in a film having better barrier properties because VLDPE is less dense than EVA (FF 73).

76. In addition, Ferguson described several multilayered films having conventional barrier layers comprising vinylidene chloride copolymer in discussing the background of its invention, e.g.,

- (i) a polyethylene/saran/polyethylene multilayer film disclosed in U.S. Patent 3,821,182 (Ex 3012, c. 1, ll. 20-24);
- (ii) a cross-linked EVA/vinylidene chloride copolymer/EVA film disclosed in U.S. Patent 3,741,253 (Ex 3012, c. 1, ll. 29-45); and,
- (iii) an EVA/Saran/EVA-LLDPE-blend film disclosed in U.S. Patent 4,457,960 (Ex 3012, c. 2, ll. 33-35).

All of the disclosures in a reference "must be evaluated for what they fairly teach one of ordinary skill in the art." In re Boe, 355 F.2d at 965, 148 CCPA at 510. Here, a fair reading of Ferguson suggests the conventionality of barrier layers comprising vinylidene chloride copolymer in multilayer packaging films based on both Ferguson's discussion of the prior art and Ferguson's not inconsistent use of a barrier layer comprising vinylidene chloride copolymer in its own exemplary multilayered films. Moreover, Cryovac has not submitted evidence sufficient to establish that one of ordinary skill in the art would have understood Ferguson to teach that only multilayer

films comprising VLDPE and vinylidene chloride copolymer possessed barrier properties. Therefore, this argument is not persuasive.

77. Cryovac also directs attention to Newsome (Ex 3013) at "c. 2, l. 41 - c. 2, l. 31, c. 8, ll. 18-20" to support Cryovac's contention that Newsome's use of a barrier layer is limited to film structures comprising LLDPE (Paper 86, p. 14, ¶ 3).

78. Newsome states that a common feature of its disclosed multilayer films "is the presence of LLDPE either as a separate layer or as a component of a blend layer" (Ex 3013, c. 8, ll. 18-20).

Again, the above citation is not inconsistent with Newsome's disclosure of conventional barrier layers comprising polyvinyl chloride polyvinylidene chloride copolymer in multilayer heat shrink packaging films.

79. In discussing the prior art, Newsome expressly notes the desirability of packaging bags that "serve as barrier to infusion of gaseous materials from the surrounding environment. Of particular importance is the provision of an effective barrier to infusion of oxygen, since oxygen is well known to cause spoilage of meat." [Ex 3013, c. 1, ll. 35-39.]

80. In particular, according to Newsome, some conventional shrink bags constructed with ethylene vinyl acetate copolymers (EVA) contain a layer of saran copolymer to serve as an oxygen barrier (Ex 3013, c. 1, ll. 53-56).

81. In addition, regarding its own invention, Newsome stated that "[i]n all the multilayer films of the invention, the barrier layer is preferably either polyvinyl chloride-polyvinylidene chloride copolymer (saran) or EVOH, or a blend of

EVOH" (Ex 3013, c. 3, ll. 25-28).

Thus, a fair reading of Newsome, like Ferguson, suggests the conventionality of barrier layers comprising polyvinyl chloride-polyvinylidene chloride copolymer (saran) in multilayer packaging films based not only on Newsome's discussion of the prior art, but also on Newsome's not inconsistent use of a barrier layer comprising polyvinyl chloride-polyvinylidene chloride copolymer (saran) in its own inventive multilayered films. Moreover, Cryovac has not submitted evidence sufficient to establish that one of ordinary skill in the art would have understood Newsome as disclosing barrier layers comprising polyvinyl chloride-polyvinylidene chloride copolymer (saran) as unconventional or as useful only with multilayer films comprising LLDPE, e.g., as not useful in multilayer films comprising EVA. Therefore, this argument is not persuasive.

Again, while we have reconsidered our initial decision, we decline to make any changes therein.

To summarize, when explicitly asked to respond to the proposed holdings of unpatentability of Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 under § 103(a) over Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 1009) alone or further in view of either Ferguson (Ex 3012) or Newsome (Ex 3013), Cryovac expressly declined to present any comments regarding the patentability of claims 1, 3-5, 10, 12-14, 23 and 24 over the prior art (FF 19). Further, according to Cryovac, the Dow CGCT technology and resins recited in the involved Cryovac '654 claims are the same technology and resins described by Lai (FF 20). The claims Cryovac did choose to address all have limitations not required by the claims 1, 3-5, 10, 12-14, 23 and 24 Cryovac chose not to

comment on, i.e., a specific density range (claim 7), a specific orientation temperature range (claims 20-22 and 25-26) and presence of a barrier layer (claim 11). The specific density and orientation temperature ranges are within ranges suggested by the prior art as discussed above. The prior art also suggests that barrier layers are conventionally used in multilayer films to lower gas and moisture permeability, e.g., to prevent moisture and air from getting through the film and detrimentally affecting packaged food, as discussed above. Finally, Cryovac has not advanced any argument with respect to objective evidence of nonobviousness demonstrating unexpected results based upon the recited density range, orientation temperature range or barrier layer required by claims 7, 11, 20-22 or 25-26. In short, Cryovac has failed to show that any of the additional limitations recited in claims 7 (density), 11 (barrier layer) or 20-22 and 25-26 (orientation temperature) distinguish over the prior art.

**D./E. Reconsideration of the unpatentability of Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 under § 103(a) over Mueller (Ex 3011) and Dow CGCT XUR-1567-48562-xx resins alone or further in view of either Ferguson (Ex 3012) or Newsome (Ex 3013)**

The proposed ground of unpatentability of Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 under § 103(a) over Mueller (Ex 3011) and Dow CGCT XUR-1567-48562-xx resins alone or further in view of either Ferguson (Ex 3012) or Newsome (Ex 3013) parallels the proposed ground of unpatentability under § 103(a) over Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 1009) alone or further in view of either Ferguson (Ex 3012) or Newsome (Ex 3013) discussed above. Dow CGCT XUR-1567-48562-xx resins are CGCT resins Dow supplied to Cryovac following execution of a confidentiality

agreement (Paper 81, p. 21, FF 5; admitted by Cryovac in Paper 86, p. 6).

The unpatentability of Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 under § 103(a) over Mueller (Ex 3011) and Dow CGCT XUR-1567-48562-xx resins alone or further in view of either Ferguson (Ex 3012) or Newsome (Ex 3013) stands or falls together with the unpatentability of Cryovac '654 claims 1, 3-5, 7, 10-14 and 20-26 under § 103(a) over Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 1009) alone or further in view of either Ferguson (Ex 3012) or Newsome (Ex 3013) discussed above.

**F. Reconsideration of the unpatentability of Cryovac '367 claims under § 103(a) over Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 3009) alone, or in view of Warren I (Ex 3022), or in further view of Ferguson (Ex 3012), Newsome (Ex 3013) and Warren II (Ex 3023)**

82. Cryovac '367 claims 1-8, 10-15, 42, 56 and 61-63 are directed to heat-shrinkable films comprising a homogeneous linear single site catalyzed copolymer of ethylene and a C<sub>3-10</sub> alpha olefin and a density of at least 0.902 g/cc, wherein the films are made by a specific process. Cryovac '367 claims 16-24 and 26-41 are directed to heat-shrinkable films comprising a homogeneous linear single site catalyzed copolymer of ethylene and a C<sub>6-8</sub> alpha olefin and a density of at least 0.902 g/cc, wherein the films are made by a specific process.
83. The ORDER set forth three proposed grounds of unpatentability of the involved Cryovac '367 claims based on the teachings of Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 3009), each based on the predicate that

[i]t would have been obvious to one of ordinary skill in the art to modify the multilayer heat shrink film of Mueller by substituting an EIPE, e.g., a preferred ethylene/1-octene copolymer, as described by Lai and Dow, for the conventional LLDPEs used by Mueller. Use of an EIPE as

described by Lai and Dow would provide processability similar to that of a conventional LDPE but with strength and other physical characteristics similar to LLDPE. [Paper 81, p. 31.]

84. Cryovac argues that "[t]he ethylene/1-octene copolymers of Lai and Dow are not homogeneous, linear single site catalyzed copolymers of ethylene and an alpha olefin, which contain no long chain branching; rather they are expressly directed to 'substantially linear' ethylene copolymer[s] which have long chain branching" (Paper 86, p. 32).
85. Lai describes resins produced using metallocene constrained geometry catalysts as having limited long chain branching, i.e., the polymer is substituted with up to 3 long chain branches/1000 carbons (Ex 3010, c. 3, ll. 48-50) (see also Paper 81, pp. 14-15 and 17-18).
86. Dow describes resins produced using the same metallocene constrained geometry catalysts disclosed by Lai (Ex 3009, pp. 2-11; Ex 3010, c. 6, l. 29 - c. 13, l. 50).

Cryovac directs attention to two other references: (i) WO 93/08221, published 29 April 1993 and listing Dow Chemical Company as applicant ("WO '221," Ex 1024), and (ii) an article by M. Naitove, "Polypropylenes Will Be The Next Wave Of Metallocene-Catalyzed Polyolefins," Plastics Technology, pp. 19-21 (August 1994) ("Naitove," Ex 1025) (Paper 86, pp. 32-33).

87. Both Lai and WO '221 define substantially linear olefin polymers as having (i) a melt flow ratio,  $I_{10}/I_2$ , of  $\geq 5.63$ , (ii) a molecular weight distribution,  $M_w/M_n$ , defined by the equation  $M_w/M_n \leq (I_{10}/I_2) - 4.63$ , of from 1.5 to 2.5, (iii) a critical shear

stress at onset of gross melt fracture greater than  $4 \times 10^6$  dyne/cm<sup>2</sup> and (iv) a polymer backbone substituted with up to 3 long chain branches/1000 carbons (Ex 3010, c. 2, ll. 25-50; c. 3, ll. 4-63; c. 14, ll. 10-11; c. 18, ll. 17-24 and 43-45; and, c. 14, ll. 8-11. Ex 1024, pp. 4-5 and 7-8).

88. WO '221 expressly describes

[t]he term "linear olefin polymers" ... [as meaning] that the olefin polymer does not have long chain branching. That is, the linear olefin polymer has an absence of long chain branching, as for example the traditional linear low density polyethylene polymers or linear high density polyethylene polymers made using Ziegler polymerization processes (e.g., USP 4,076,698 (Anderson et al.)), sometimes called heterogeneous polymers. The term "linear olefin polymers" does not refer to high pressure branched polyethylene, ethylene/vinyl acetate copolymers, or ethylene/vinyl alcohol copolymers which are known to those skilled in the art to have numerous long chain branches. The term "linear olefin polymers" also refers to polymers made using uniform branching distribution polymerization processes, sometimes called homogeneous polymers. Such uniformly branched or homogeneous polymers include those made as described in USP 3,645,992 (Elston) and those made using so-called single site catalysts in a batch reactor having relatively high olefin concentrations (as described in U.S. Patent 5,026,798 (Canich) or in U.S. Patent 5,055,438 (Canich)) or those made using constrained geometry catalysts in a batch reactor also having relatively high olefin concentrations (as described in U.S. Patent 5,064,802 (Stevens et al.) or in EPA 0 416 815 A2 (Stevens et al.)). The uniformly branched/homogeneous polymers are those polymers in which the comonomer is randomly distributed within a given interpolymer molecule and substantially all of the interpolymer molecules have the same ethylene/comonomer ratio within that interpolymer, but these polymers too have an absence of long chain branching, as, for example Exxon Chemical has taught in their February 1992 Tappi Journal paper. [Ex 1024, p. 7, ¶ 1.]

89. In contrast, WO '221 describes "substantially linear" as meaning "that the polymer backbone is substituted with 0.01 long chain branches/1000 carbons to 3 long chain branches/1000 carbons" (Ex 1024, p. 7 last three lines).



90. Naitove states that

Exxon Chemical ... claims to have pushed its ... metallocene technology a step ahead with the addition of "APT" (Advanced Performance Terpolymers) to its Exact plastomer line. ... In his Metcon paper, Dirk J. Michiels, Exact film technology team leader, conceded that the narrow molecular-weight distribution of earlier Exact resins produces high melt viscosity and low melt strength, which limits output rates in monolayer blown film extrusion.

\* \* \* \* \*

Michiels reported that the APT resin matches the processability of Affinity plastomers from Dow Plastics, ... despite the lack of "long-chain branching," which Dow says improves the processability of the metallocene resins. ... [Ex 1025, p. 19, ¶ bridging cc. 1-2 and ¶ bridging cc. 2-3.]

Cryovac's arguments and supporting evidence are sufficient to establish that the CGCT resins described by Lai (Ex 3010) and Dow (Ex 3009) are not "linear" copolymers required by all of the involved Cryovac '367 claims, but rather "substantially linear" copolymers having up to 3 long chain branches/1000 carbons.

Therefore, upon reconsideration, the proposed grounds of unpatentability of Cryovac '367 claims 1-8, 10-24, 26-43, 46-56 and 61-63 under § 103(a) over Mueller (Ex 3011), Lai (Ex 3010) and Dow (Ex 3009) alone, or in view of Warren I (Ex 3022), or in further view of Ferguson (Ex 3012), Newsome (Ex 3013) and Warren II (Ex 3023) as set forth in the ORDER (Paper 81, pp. 29-35) are withdrawn.

**G. Reconsideration of the patentability of Cryovac '367 claims under § 103(a) over Mueller (Ex 3011) and Dow CGCT-XUR 1567-48562-xx resins alone, or in view of Warren I (Ex 3022), or in further view of Ferguson (Ex 3012), Newsome (Ex 3013) and Warren II (Ex 3023)**

91. The ORDER also set forth three proposed grounds of unpatentability of Cryovac '367 claims 1-8, 11-24, 26-43, 46-56 and 61-62 based on the teachings of

Mueller (Ex 3011) and Dow CGCT-XUR 1567-48562-xx resins, each based on the predicate that

it would have been obvious to one of ordinary skill in the art to modify the heat shrink film of Mueller by substituting Dow CGCT XUR-1567-48562-xx resins for the conventional LLDPEs used by Mueller. Insofar as the MWD of CGCT XUR-1567-48562-xx resins is independent of their MI, CGCT XUR-1567-48562-xx resins [sic] can be tailored to improve processability without sacrificing toughness through routine optimization of result effective variables, e.g., amount of comonomer used, to provide MWD and CD tailored for film extrusion (FF 56 and 58; Exs 3017-3019 (all)). Furthermore, Dow CGCT XUR-1567-48562-xx resins have densities similar to that of LLDPEs, e.g., 0.915 g/cm<sup>3</sup>, are said to melt at 109°C and have a Vicat softening point of 102°C and, therefore, would orient at temperature of hot water, e.g., 83°C to 115°C. In other words, use of CGCT XUR-1567-48562-xx resins, e.g., -A5, would provide lower heat seal initiation temperatures, faster sealing speeds, improved film optics, lower hexane extractables, better orientation, shrinkage at lower temperatures, etc. and provide processability similar to LDPE, e.g., be useful in a cascading water extrusion film making process. [Paper 81, ¶ bridging pp. 35-36.]

Cryovac's arguments and supporting evidence are sufficient to establish that the Dow CGCT XUR-1567-48562 resins, produced by the same technology described by Lai (Ex 3010) and Dow (Ex 3009), are not "linear" copolymers as required by all of the involved Cryovac '367 claims, but rather "substantially linear" copolymers having up to 3 long chain branches/1000 carbons.

Therefore, upon reconsideration, the proposed grounds of unpatentability of Cryovac '367 claims 1-8, 11-24, 26-43, 46-56 and 61-63 under § 103(a) over Mueller (Ex 3011) and Dow CGCT XUR-1567-48562-xx resins alone, or in view of Warren I (Ex 3022), or in further view of Ferguson (Ex 3012), Newsome (Ex 3013) and Warren II (Ex 3023) as set forth in the ORDER (Paper 81, pp. 29-35) are withdrawn.

Enc.: Kirk-Othmer *ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY*, fourth edition, Volume 17, p. 756, published by John Wiley & Sons, Inc., New York (1996) ("Kirk-Othmer 1996") (Ex 3024).

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